# Space Weather Forecast

Issued on Saturday, 11 February 2023 at 13:08 Local

**This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales**

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**Space Weather Forecast Headline: Moderate flares expected (R1/R2 Radio Blackouts).**

**Analysis of Space Weather Activity over past 24 hours**

**Solar Activity:** Solar activity has been Moderate (R1/Radio Blackouts) over the past 24 hours. The largest event was a Moderate flare from a sunspot region located near the west limb, which is due to rotate off disc soon. However, other regions have been sources for Moderate flares over the past 24 hours, especially the large and magnetically complex region in the northeast quadrant, which is now showing signs of simplification and having lost some of its magnetic complexity. The other main region in the southeast. Despite a lack of recent flares, and only a modest size, has continued to show some growth and increasing magnetic complexity. There are currently eleven sunspot regions on the visible disc, with one new and unnumbered region in the southeast quadrant, although all other regions appear to be generally small, simple and relatively stable.

A CME (coronal mass ejection) was observed leaving the southwest quadrant of the Sun due to the eruption of a 'filament', which is a line of material held together by the Sun's magnetism. This CME has been assessed as likely missing Earth, but with a glancing interaction possible late on the 14th or 15th (days 4 or 5). A couple of other CMEs occurred, however these are off the Earth-Sun line.

**Solar Wind / Geomagnetic Activity:** Solar winds continued to be slightly elevated to elevated, perhaps due to weak glancing CME influences. Observed speeds ranged between 480-550 km/s. The magnetic field strength was mainly weak, with the north-south component varying weakly. Geomagnetic activity was Quiet to Unsettled (Kp 2-3), but with Active interval (Kp 4) between 10/2100-11/0000 UTC.

**Energetic Particles / Solar Radiation:** The count rate of energetic particles is at Background levels with no solar radiation storms observed.

**Four-Day Space Weather Forecast Summary**
**Solar Activity:** Moderate activity expected with further Moderate flares expected and a slight chance of Strong flares. The main risk is from AR3217 and AR3213.

**Solar Wind / Geomagnetic Activity:** CMEs which left the Sun on the 7th and 10th, while forecast to miss the Earth, give a low chance of glancing interactions on days 1 and 4 (11th and 14th). Otherwise current slightly elevated solar winds are expected to erratically ease, with no other significant enhancements expected. Geomagnetic activity is expected to be mostly Quiet to Unsettled, with a decreasing chance of Active intervals. Any CME glance, however, has the potential to bring a more persistent Unsettled to Active spell, and a very slight chance of G1 Minor Storms day 1 and 4 (11th and 15th).

**Energetic Particles / Solar Radiation:** The count rate of energetic particles is expected to

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remain at background, but there is a very slight chance of this increasing towards the S1/Minor radiation storm level in response to any significant flares that occur.

**Geomagnetic Storms:**

| Geo-Magnetic Storm Probability (Exceedance) | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Minor or Moderate | G1 to G2 | No | 5 | 1 | 1 | 10 |
| Strong | G3 | No | 1 | 1 | 1 | 1 |
| Severe | G4 | No | 1 | 1 | 1 | 1 |
| Extreme | G5 | No | 1 | 1 | 1 | 1 |

**Radio Blackouts - X Ray Flares:**

| X Ray Flares Probability | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Active | R1-R2 M Class | Yes | 70 | 70 | 60 | 50 |
| Very Active | R3 to R5 X | No | 15 | 15 | 10 | 10 |

**Solar Radiation Storms - (High Energy Protons):**

| Radiation Storms Probability (Exceedance) | Level ($cm^{-2}$ $sr^{-1}$ $s^{-1}$) | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Active | ≥ S1 | No | 5 | 5 | 10 | 10 |
| Very Active | ≥ S3 * | No | 1 | 1 | 1 | 1 |

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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